United States Patent [19]

Leaf

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[54] **PORTABLE DRILL PRESS MECHANISM**

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[51] **Int. Cl.**[3] **B23B 45/14**

[52] **U.S. Cl.** **408/236**; 408/712

[58] **Field of Search** 408/103, 111, 713, 99, 408/100, 105, 103, 110, 94, 702, 90, 89, 88, 79, 80, 81, 82, 83, 93, 108, 234, 236

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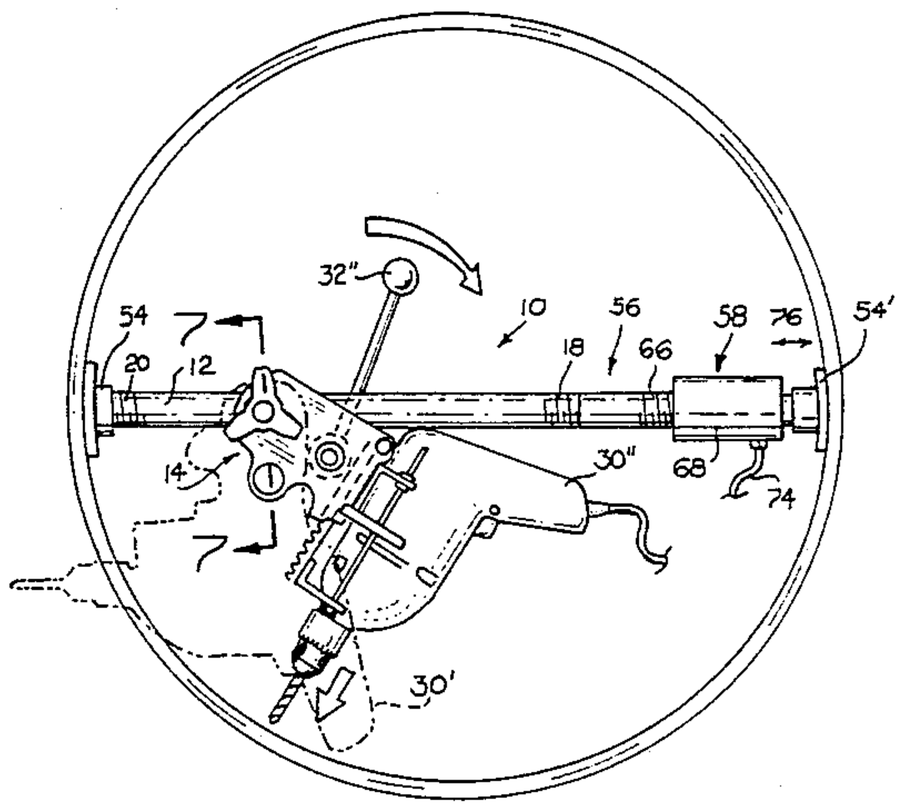
[57] **ABSTRACT**

A portable drill press mechanism for electric hand drill characterized by a support post, a drill support assembly coupled to the support post, and clamping members removably attached to one or both ends of the support post. The drill support assembly has a drill clamp for attaching the hand drill to a movable carriage under the control of a carriage actuating mechanism. An angular adjustment mechanism is provided in the drill support assembly so that the hand drill can drill holes at various angular orientations relative the support post. Various clamping members are provided for special jobs, such as drilling into a work piece of rectangular cross-section, or drilling a hole from the inside of a large cylindrical container.

13 Claims, 7 Drawing Figures



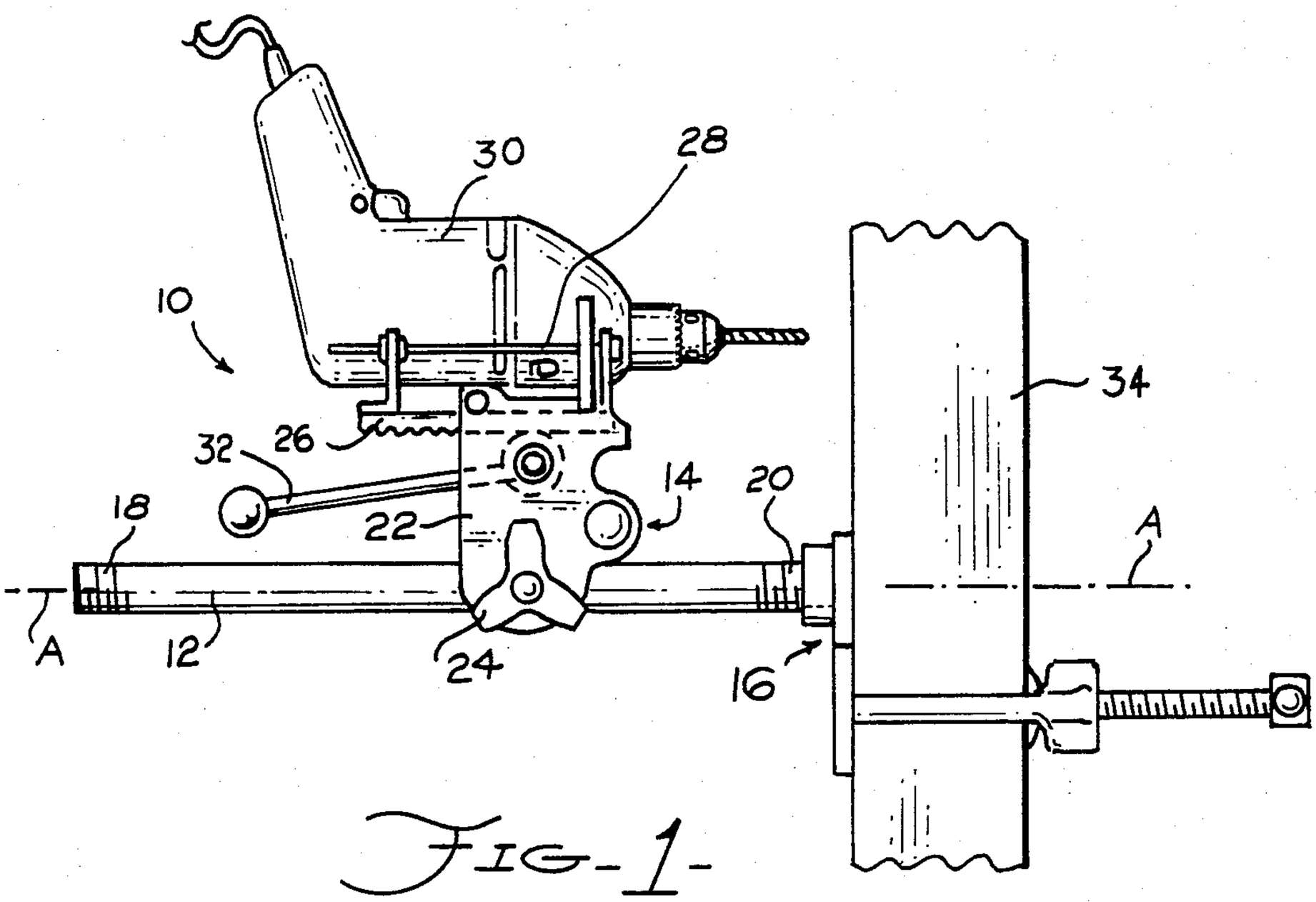
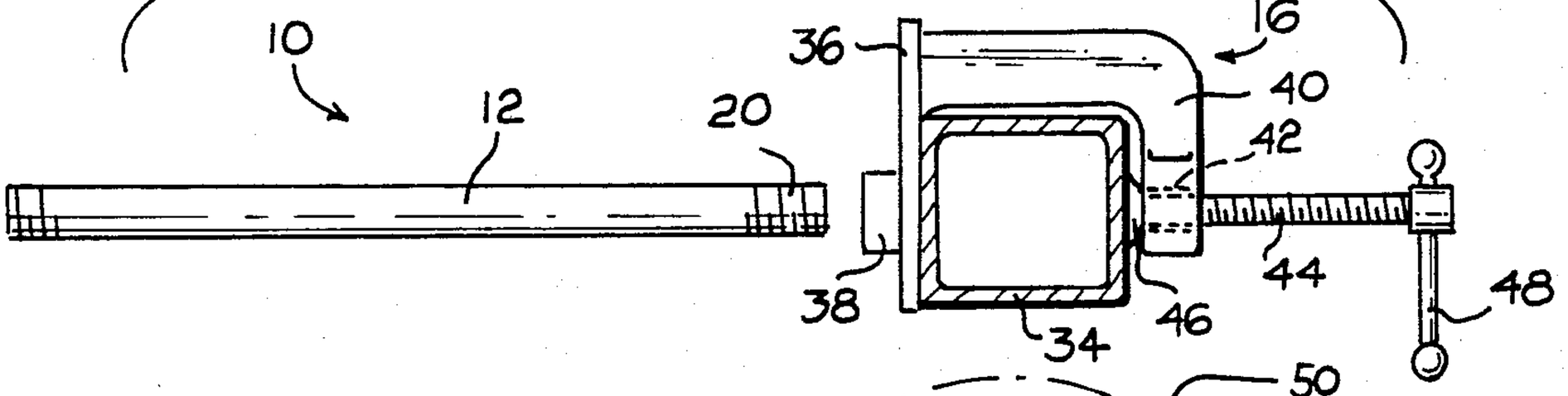


FIG-1-

FIG-2-



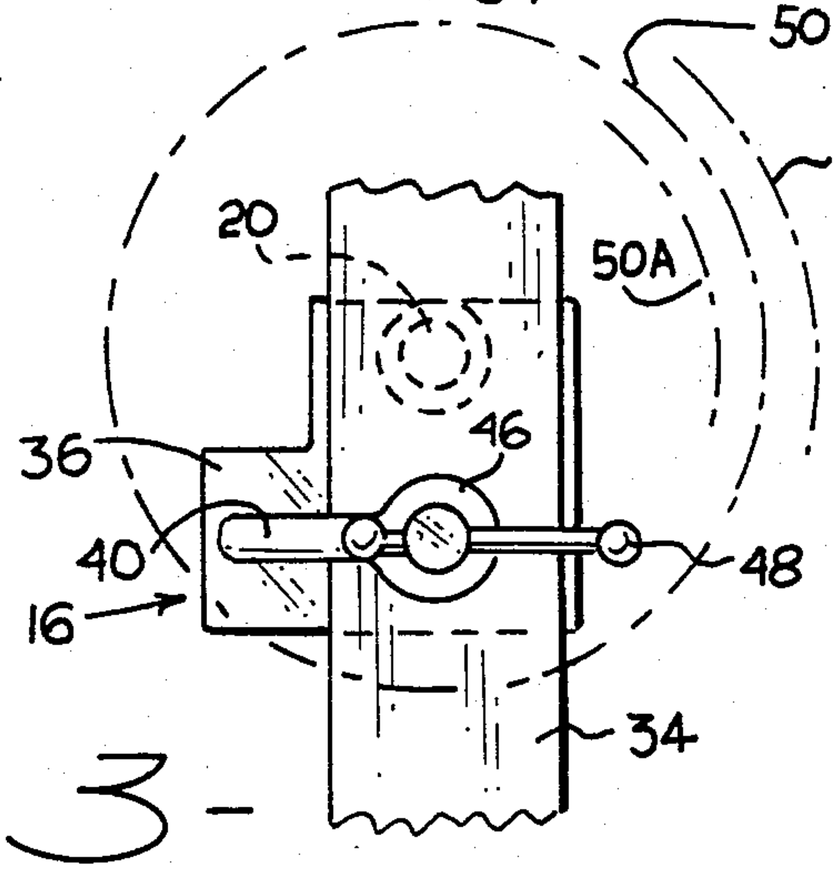


FIG-3-

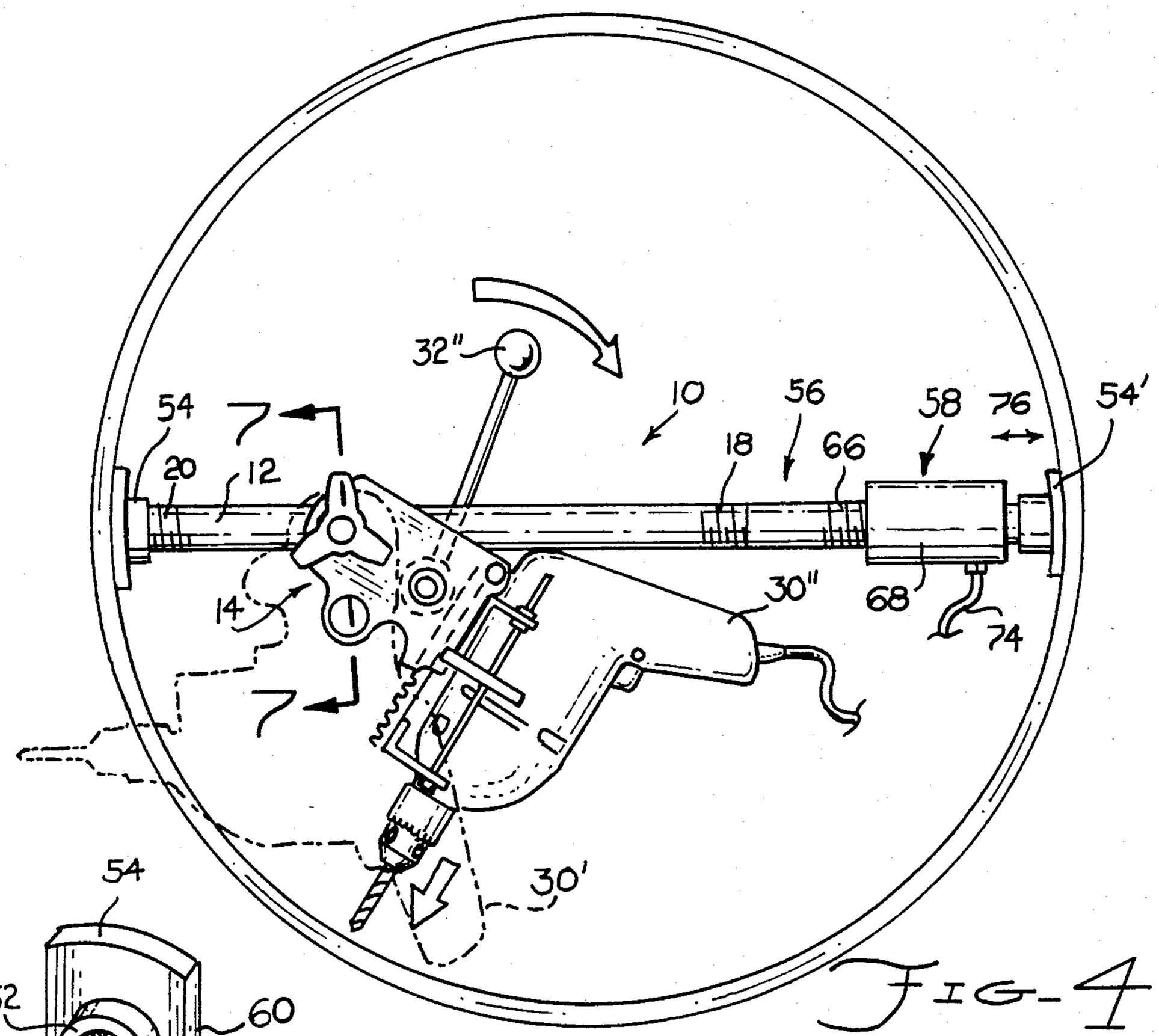


FIG-4

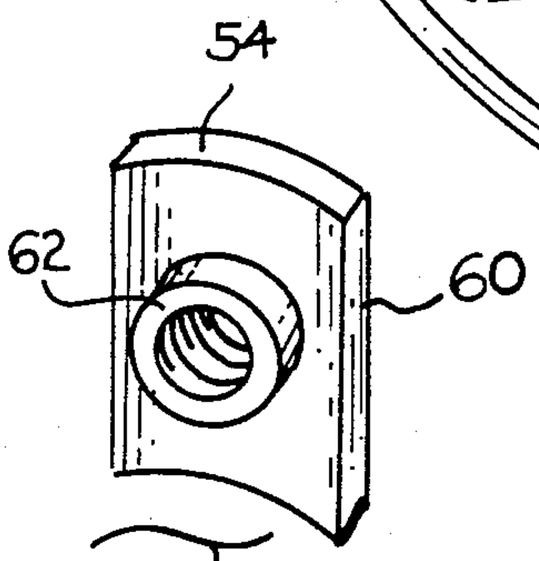


FIG-5

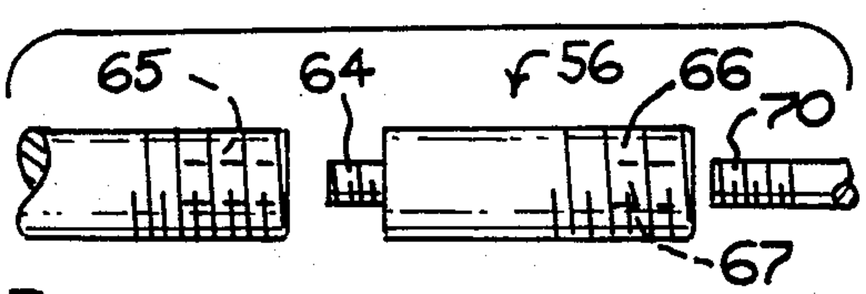


FIG-6

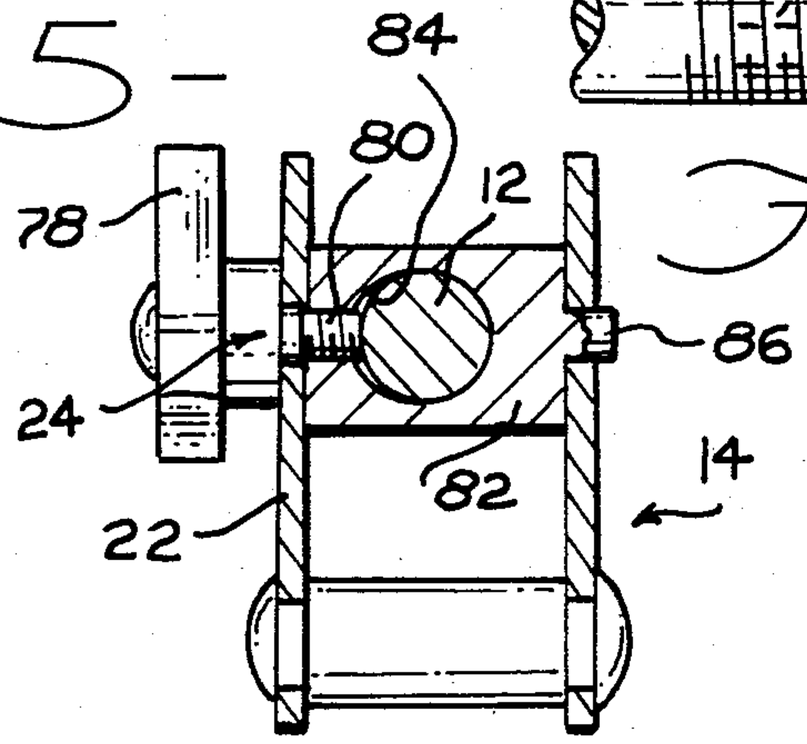


FIG-7

PORTABLE DRILL PRESS MECHANISM

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to drill press mechanisms and more particularly to portable drill press mechanisms for electric hand drills.

2. Description of the Prior Art

Portable drill press mechanisms are known in the prior art. For example in U.S. Pat. No. 4,010,943 of Eft, a drill support and guide apparatus is shown including a pair of guide posts 28, a pair of C clamps 40 attached to the guide posts, and a screw mechanism for urging a power drill 14 towards a work piece 12. U.S. Pat. No. 2,468,358 of Clark teaches a similar mechanism having a slightly different clamping means.

Similar portable drill presses can be found in U.S. Pat. Nos. 2,373,065 of Piersall, 2,625,063 of Hanson, 3,089,357 of Grau, 3,979,165 of Pyle, and 3,810,710 of Ennemoser. All of the above cited patents are characterized by an elongated support post and means of attaching an electrical hand drill to the support post such that the hand drill can be urged in the direction of a work piece by a suitable mechanism.

A disadvantage of prior art portable drill press mechanisms is that they are usually special purpose devices designed to do one or two specialized jobs. For example, the drill press mechanism of Ennemoser has a base plate clamping mechanism which allows it to be used solely for the purpose of drilling out vehicle wheel studs. While other portable drill press mechanisms are slightly more flexible in use, they are all limited by the type of base clamp they use.

A further disadvantage with prior art portable drill press mechanisms is that they are designed to move an electric hand drill in a direction parallel to their support post. Again, this limits their usefulness, since it is often necessary to drill angled holes into a work piece.

SUMMARY OF THE INVENTION

An object of this invention is to provide a portable drill press mechanism which can be used on a variety of work pieces and in a number of working environments.

Another object of this invention is to provide a portable drill press mechanism which can drill into a work piece at a number of user selectable angles.

Briefly, the invention comprises an elongated support post having threads provided at both ends, a drill support assembly coupled to the support post, and a number of interchangable clamping members attached to one or both of the ends of the support post.

The drill support assembly preferably includes a body portion including a angular adjustment mechanism, a post clamp member attaching the body portion to the support post, a carriage attached to the body portion, a carriage actuating mechanism for moving the carriage relative to the body portion, and a drill clamp attached to the carriage and adapted to clamp an electric hand drill thereto. The position of the drill support assembly on the support post can be varied by means of the post clamp member, and the angle at which the hole will be drilled can be varied by means of the angular adjustment mechanism.

A number of clamping mechanisms can be attached to one or both ends of the support posts. For example, a clamping mechanism including a base plate, a nut attached to the base plate and receptive to a threaded

end of the support post, and part of a C clamp attached to the other side of the base plate will allow the portable drill press mechanism to be attached to a work piece of rectangular cross section. If a curved shoe is attached to one end of the support post, and a hydraulic ram provided with a second curved shoe is attached to the other end of the guide post, the portable drill press mechanism of this invention can be used to drill holes from inside a cylindrical container such as a boiler.

An advantage of this invention is that the clamping mechanisms that attach to either or both ends of the support post are removable and replacable so that the drill press mechanism can be used for a variety of purposes and under many different working situations.

Another advantage of this invention is that the drill support assembly is angularly adjustable so that the electric hand drill can be moved in angular directions relative to the support post.

These and other objects and advantages of the present invention will no doubt become apparent upon a reading of the following descriptions and a study of the several figures of the drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. **1** is a front elevational view of a portable drill press mechanism in accordance with the present invention.

FIG. **2** is a partially disassembled, bottom plan view of the mechanism shown in FIG. **1**.

FIG. **3** is a right end view of the mechanism shown in FIG. **2**.

FIG. **4** is a front elevational view of the drill press mechanism having end clamps which allow the mechanism to drill a hole from inside a cylindrical work piece.

FIG. **5** is a detail view of the clamping shoe **54** shown in FIG. **4**.

FIG. **6** is a detail view of the extension piece **56** shown in FIG. **4**.

FIG. **7** is a cross sectional view taken along line 7—7 of FIG. **4**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

Referring to FIG. **1**, a portable drill press mechanism **10** in accordance with the present invention includes an elongated support post **12**, a drill support assembly **14**, and at least one clamping member **16**. Support post **12** is preferably an elongated section of a rod or pipe having a longitudinal axis A and provided with threaded end portions **18** and **20**.

Drill support assembly **14** includes a body portion **22**, a clamping mechanism **24** for attaching body portion **22** to post **12**, a carriage assembly **26** coupled to the body portion, a clamping mechanism **28** attaching an electric hand drill **30** to carriage assembly **26**, and a carriage actuating mechanism **32** for moving carriage assembly **26** back and forth. Not shown in FIG. **1** is an angular adjustment mechanism which allows the angular movement of the carriage assembly **26** and thus the hand drill **32** to be varied relative to the longitudinal axis A of support post **12**. The workings of the angular adjustment mechanism and the other mechanisms of the drill support assembly will be discussed in greater detail subsequently with reference to FIGS. **6** and **7**.

In FIG. **2**, drill mechanism **10** is shown in a partially disassembled form with the drill support assembly **14** removed and with support post **12** separated from

clamping member **16**. Clamping member **16** is particularly adapted to clamp the drill press mechanism **10** to an elongated work piece **34** having a rectangular cross section. The clamping member **16** includes a base plate **36**, a nut **38** attached to one side of the base plate, and an L shaped member **40** attached to the other side of the base plate **36** and extending rearwardly therefrom. The L shaped member **40** (which is actually part of a C clamp) is provided with a threaded bore **42** that is receptive to a threaded shaft **44**. Attached to one end of threaded shaft **44** is a swivel shoe **46**, and attached to the other end of the shaft is a handle **48**. As the threaded shaft **44** is rotated by means of handle **48**, swivel shoe **46** is urged towards or away from base plate **36** to clamp or unclamp the member **16** from work piece **34**.

As seen in FIG. **3**, base plate **36** is substantially L shaped so that it conforms as closely as possible to the surface of work piece **34**. By loosening clamping mechanism **24**, drill support assembly **14** can be rotated around support post **12** to provide a drilling radius as indicated at **50**. As indicated at **50A** and **50B**, as the angular orientation of drill support assembly **14** is varied (as will discussed subsequently) the drilling radius can be decreased or increased from the nominal radius shown at **50**. Of course, the reduced or increased drilling radius will also produce angled bore holes in the work piece **34**.

In FIG. **4**, attachments are shown which allows the drill press mechanism **10** to be used to drill holes within a cylindrical work piece **52** such as inside a hot water boiler. To utilize drill press mechanism **10** under this type of environment, several specialized clamping members are used including a clamping shoe **54** (see also FIG. **5**), an extension piece **56**, a hydraulic or pneumatic ram assembly **58**, and another shoe **54'**.

Shoe **54** includes a curved plate **60**, and a threaded nut **62** receptive to end **20** of support post **12**. With an additional reference to FIG. **6**, extension piece **56** includes a threaded post **66** and a threaded stud **64**. The threaded stud **64** can engage a threaded bore **65** provided in end **18** of support post **12**. The free end of post **66** is provided with a threaded bore **67**. The diameter of post **66** is preferably the same as the diameter of post **12**. Ram assembly **58** includes a cylinder **68**, a threaded stud **70** attached to one end of cylinder **68** and engaging the bore **67** of post **66**, and a piston shaft **72** extending out of one end of cylinder **68** and provided with appropriate threads. A fluid pressure (such as from a compressed air or pressurized liquid fluid source) is provided at inlet tube **74** to cause piston shaft **72** to move back and forth as indicated at **76**. The shoe **54'** engages the end of threaded shaft **72**.

In use, a sufficient number of extension pieces **56** are attached to support post **12** so that the entire assembly is slightly less than the internal diameter of work piece **52**. A fluid is then applied to inlet **74** to cause piston shaft **72** to extend outwardly from cylinder **68** and to firmly clamp shoe **54** against the inner circumference of work piece **52**. The actuating lever of carriage actuating mechanism **32** is then used to cause a drill **30'** to bore a hole through the wall of work piece **52**. As shown in the figure at **30'**, the hole that will be bored will be along a chord of the cylindrical work piece **52**. By adjusting the angular adjustment means of the drill support assembly **14**, the drill can be caused to move to a position **30''** and the actuating mechanism to a position **32''**. In this position radial holes can be drilled through the work piece **52**.

Referring to the cross-section of FIG. **7**, the clamping portion **24** includes a handle **78**, a threaded stud **80** having one end attached to handle **78** and its other end abutting support post **12**, and a swivel member **82** provided with a bore **84** receptive to post **12**. Swivel member **84** may pivot around an extension **86** and stud **80** when handle **78** is loosened. In use, when handle **78** is loosened, body portion **22** is free to move up and down post **12** and any extension pieces **56**, as well as swivel back and forth as shown in FIG. **4**. When handle **78** is tightened, the body portion **22** is locked in position by the tension of clamping mechanism **28**.

While this invention has been described in terms of a few preferred embodiments, it is contemplated that persons reading the preceding descriptions and studying the drawing will realize various alterations, permutations and modifications thereof. It is therefore intended that the following appended claims be interpreted as including all such alterations, permutations and modifications as fall within the true spirit and scope of the present invention.

What is claimed is:

1. A portable drill press mechanism for an electric hand drill comprising:

an elongated support post having a longitudinal axis;

a drill support assembly including a body portion, a swivel member provided with a transverse bore through which said post may extend, first pivot means for pivotally attaching a first end of said swivel member to said body portion, set screw means including a threaded stud having a first end engaged with a threaded bore provided in a second end of said swivel member where said stud may cooperate with said pivot means to allow rotation of said swivel member, said set screw means further including handle means attached to a second end of said stud such that rotation of said handle may cause said first end of said stud to engage a portion of said post disposed within said bore, carriage means attached to said body portion, a carriage actuating mechanism for moving said carriage means relative said body portion, and clamping means attached to said carriage means for clamping said electric hand drill to said carriage means; and

means attached to a first end of said post to engage a surface of a work piece.

2. A portable drill press mechanism as recited in claim **1** wherein said means attached to a first end of said post is removably attachable to said post.

3. A portable drill press mechanism as recited in claim **1** further comprising means attached to a second end of said post to engage a second surface of said work piece.

4. A portable drill press mechanism as recited in claim **3** wherein said means attached to a second end of said post is removably attachable to said post.

5. A portable drill press mechaism as recited in claim **1** wherein said means attached to a first end of said post includes a base plate, means for removably attaching said base plate to said first end of said support post, an L shaped clamp member attached to said base plate parallel to said longitudinal axis of said support post, and a threaded clamp member engaged with a threaded bore of said L shaped clamp member and adapted to provide a clamping force in the direction of said base plate.

6. A portable drill press mechanism as recited in claim **5** wherein said base plate is L shaped, whereby said first

clamping means is adapted to clamp to work piece having a substantially rectangular cross-section.

7. A portable drill press mechanism as recited in claim 4 wherein said means attached to a second end of said post includes means for providing a clamping force in a direction away from said support post.

8. A portable drill press mechanism as recited in claim 7 wherein said means for provding a clamping force provides said force substantially co-axially to said axis of said support post.

9. A portable drill press mechaism as recited in claim 8 wherein said means for providing a clamping force includes a fluid driven ram.

10. A portable drill press mechanism as recited in claim 9 wherein said means attached to a first end of said post includes a first shoe adapted to engage an inner surface of said work piece.

11. A portable drill press mechanism as recited in claim 9 wherein said means for providing a clamping force includes a second shoe attached to said fluid driven ram and adapted to engage an inner surface of said work piece.

12. A portable drill press mechanism as recited in claim 1 further comprising at least a first extension piece coaxially attached to an end of said post, said first extension piece having substantially the same circumference as said post.

13. A portable drill press mechanism as recited in claim 12 further comprising a second extension piece coaxially attached to a free end of said first extension piece, said second extension piece having substantially the same circumference as said first extension piece and said post.

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